Part A – Multiple Choice

[K/U**] (5 Marks)**

1. A car is traveling north when it enters a curve. It maintains a constant speed and leaves the curve traveling east. The direction of the car's acceleration is …
This question covers the Dynamics unit and the expectations [B2.6, B2.7, B3.3].

a. South – East
b. South
c. North – East
d. There is **no** acceleration
e. East

2. A beam of light is shone forward from a moving vehicle. The speed of light leaving the vehicle will be …
This question covers the Modern Physics unit and the expectations [F2.1, F2.3, F3.3].

a. dependent on the speed of the vehicle
b. the addition of the speed of light plus the speed of the vehicle
c. at the speed of light
d. slower so that the addition of the vehicle's speed can
e. none of the above

3. A 0.25-kg apple is gently hung from a spring that stretches 4.6 cm. If the spring constant is 53M/m what is the force exerted on the spring?
This question covers the Energy and Momentum unit and the expectations [C2.1, C2.2, C2.6, C3.1].

a. 0.056 N [down]
b. 0.056 N [up]
c. 2.4N [down]
d. 2.4N [up]
e. 240N [down]

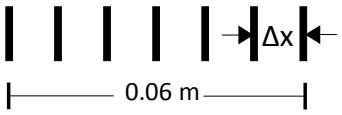
4. The electrostatic force between point charges A and B is 3.7×10^{-3} N . If the distance between the charges is doubled while charge A is doubled and charge B is halved, the force between them will be …

This question covers the GEM Fields unit and the expectations [D2.2, D3.2].

a. 3.7×10^{-3} N
b. 9.2×10^{-4} N
c. 3.7×10^{-4} N
d. Not enough information
e. 1.4×10^{-3} N

5. A student performs Young's experiment with a single-colour source and finds the distance between the first and last nodal lines is 0.06 m. The screen is located 3.0 m from the slits. If the slit separation is 2.2×10^{2} µm. The wavelength of the light is …

This question covers the Wave Nature of Light unit and the expectations [E2: E2.1, E2.3, E2.4, E3.2].

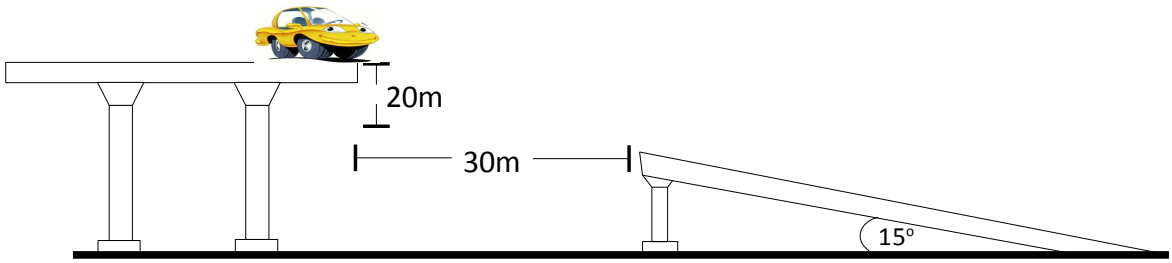


a. 7.29×10^{-7} m
b. 3.7×10^{-4} m
c. 9.2×10^{30} m
d. 7.3×10^{-7} m
e. 7.3×10^{-5} m

Part B – Problem Solving

(34 Marks)

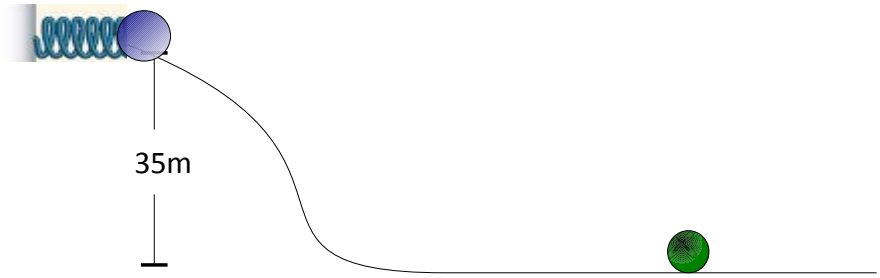
1. The accelerator of Dane's Prius got stuck. During his panic to put the car into neutral (to stop the acceleration) Dane's car flew off an unfinished road. If the Prius' velocity was 58 km/hr at the moment it left the road … **This questions covers the Dynamics unit and expectations** [B2.2, B2.3, B2.4, B2.5]



a) neglecting air resistance did Dane make it to the second portion of the road shown below? **[K/U] /3** marks

b) assuming the car was traveling 25m/s down the ramp when it landed and the coefficient of kinetic friction between Dane's skidding tires and the ramp is 0.6. If the car's mass was 500kg how long did it take Dane to come to a complete stop? **[T/I] /5** marks

2. After falling asleep in class one day Lesley (55Kg) awoke to find herself in a glass ball which was compressing a spring 556 cm. The spring constant was 73.4 N/m. Once you release the ball, Lesley rolled down a frictionless hill until she collided with a second ball with a mass of 31.0kg, shown below.
This questions covers the Energy and Momentum unit and expectations [C2.3, C2.6, C3.1, C3.3-3.5]



a) You want to know what Lesley's speed was just before the collision.
[T/I] /3 marks

b) If the collision was an elastic collision what was Lesley's and the second ball's momentum after the collision? **[APPS] /6** marks

3. A red light wave has a frequency of 4.62×10^{14} Hz and a speed of 3.0×10^{8} m/s through air. If the red light passes from the air into a glass window . . .
This questions covers the Wave Nature of Light unit and expectations [E2.2, E2.3, E3.2, E3.3]

a) What will be the speed of the red light through the glass? **[K/U] /2** marks
($n_{air} = 1.00$, $n_{glass} = 1.52$)

b) Now if that same red light passes through a beaker ($n_{beaker} = 1.52$) containing a thin walled cleatr test tube in which both the beaker and test tube ($n_{tt} = 1.52$) are filled with the same liquid ($n_{liquid} = 1.52$). Explain what you will observe and fully explain why you would observed this. **[APPS] /5** marks

4. At the her first chance, Mr. Gibson's fiancée fled Earth an Mr. Gibson at a speed of 0.87c relative to Earth. Observers from Earth measured her length to be 1.5m.
This questions covers the Modern Physics unit and expectations [F2.3, F3.3]

a) Is her proper length measured as from her frame of reference or Earth's frame of reference? **[K/U] /1** marks

b) What is her proper length? **[T/I] /2** marks

c) Since she is so excited to be fleeing Mr. Gibson, she is breathing fast at and takes one breath every 0.5 seconds. How much time do people of Earth observe between breaths? **[T/I] /2** marks

5. An electron traveling at 1.5×10^5 m/s enters two charge plates with an angle of depression of 37^0. If the electron exits after 1.67s the with no velocity in the vertical direction what is the value of the electric field. (electron mass: 9.11×10^{-31} kg, electron charge: 1.60×10^{-31}.

This questions covers the fields unit and expectations [D2.3, D2.4, D3.1, D3.3]

[K/U] /2 marks **+ [T/I] /3** marks